

B.4 Decimals on the Number Line

Essential Question How can you use a number line to order positive and negative decimals?
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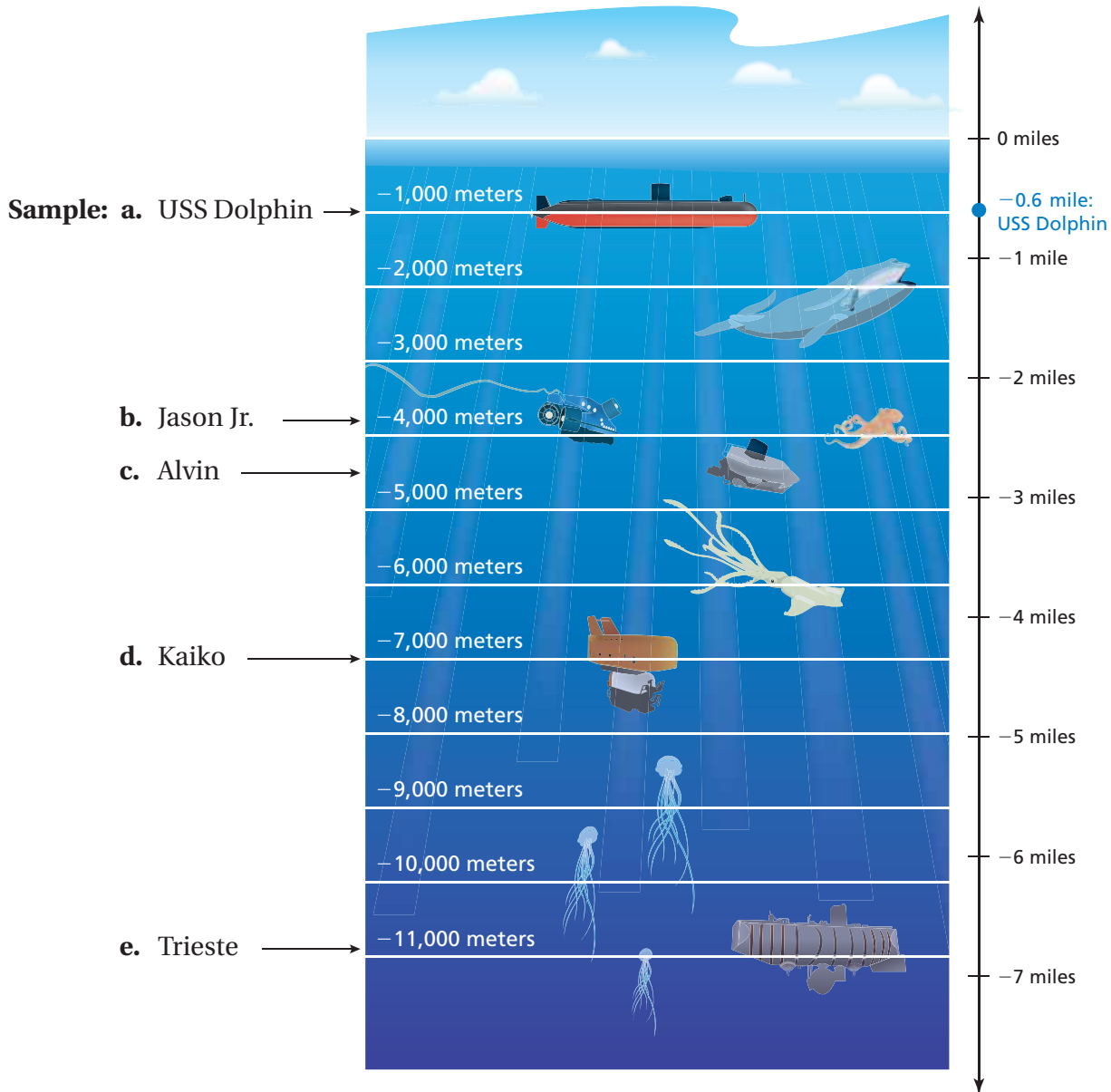
1 ACTIVITY: Locating Decimals on a Number Line

Work with a partner. Estimate the elevation (in miles) of each object.

Positive Elevations: Above sea level

Zero Elevation: Sea level

Negative Elevations: Below sea level



2 ACTIVITY: Decimals on a Number Line

Work with a partner. Write the position of the diver in kilometers.

a. Snorkeling
–5 meters



b. Scuba Diving
–50 meters



c. Deep Sea Diving
–700 meters



3 ACTIVITY: Oceanography Project

Work with a partner. Write a report that describes two ways in which mathematics is used in oceanography.



What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you use a number line to order positive and negative decimals?
5. Draw a number line. Label three points between -2 and -1 .

Practice

Use what you learned about decimals on the number line to complete Exercises 3–6 on page A34.

2 ACTIVITY: Decimals on a Number Line

Work with a partner. Write the position of the diver in kilometers.

a. Snorkeling
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3 ACTIVITY: Oceanography Project

Work with a partner. Oceanography is the study of Earth's oceans.

Oceanographers study everything about the ocean, including marine animals, currents and waves, and the ocean floor. Research oceanography and write a report that describes two ways in which mathematics is used in oceanography.



What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you use a number line to order positive and negative decimals?
5. Draw a number line. Label three points between -2 and -1 .

Practice

Use what you learned about decimals on the number line to complete Exercises 3–6 on page A34.

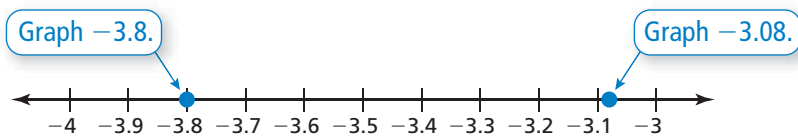
EXAMPLE 1 Comparing Decimals

a. Which is greater, 2.5 or -2.7 ?

Any positive number is greater than *any* negative number.

∴ So, 2.5 is greater.

b. Which is greater, -3.8 or -3.08 ?



∴ -3.08 is to the right of -3.8 . So, -3.08 is greater.

On Your Own

Which number is greater? Explain.

- | | |
|-----------------|-------------------|
| 1. $-0.5, 0.3$ | 2. $-2, -0.2$ |
| 3. $-4.1, -1.4$ | 4. $-3.42, -3.24$ |

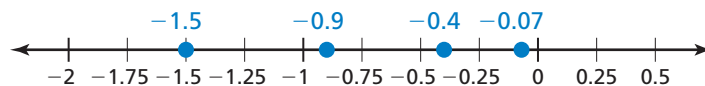
Now You're Ready
Exercises 7–14

EXAMPLE 2 Standardized Test Practice

Which of the following numbers has a value between -1 and -0.5 ?

- (A) -1.5 (B) -0.9 (C) -0.4 (D) -0.07

Graph the numbers on a number line.



The only given number that is between -1 and -0.5 is -0.9 .

∴ The correct answer is (B).

On Your Own

Use a number line to determine whether the number is between -2.5 and -3.5 .

- | | |
|------------|------------|
| 5. -2 | 6. -3.1 |
| 7. -2.75 | 8. -2.08 |

Now You're Ready
Exercises 15–22

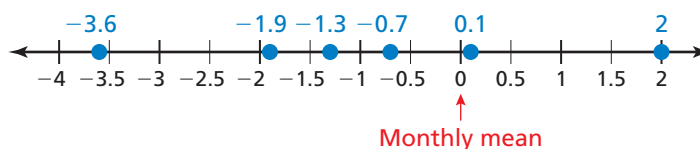
EXAMPLE 3 Real-Life Application

The table shows the amount (in inches) of rainfall above or below the monthly mean for a coastal city during a recent hurricane season.

Month	June	July	Aug.	Sept.	Oct.	Nov.
Rainfall Compared to Monthly Mean	0.1	-0.7	-1.3	-3.6	2	-1.9

- Which months had less rainfall than the monthly mean?
- Which month had rainfall closest to its monthly mean?
- Which month had rainfall farthest from its monthly mean?

- Graph each number on a number line. Let 0 represent the monthly mean. The months that had less rainfall than the monthly mean are to the left of 0 on the number line.



So, July, August, September, and November had less rainfall than the monthly mean.

- The number closest to 0 on the number line is 0.1.

So, June had rainfall closest to its monthly mean.

- The number farthest to the left on the number line is -3.6 . The number farthest to the right is 2. The number farthest from 0 is -3.6 .

So, September had rainfall farthest from its monthly mean.

On Your Own

- The table shows the amount (in inches) of rainfall above or below the monthly mean for an inland city during a recent hurricane season.

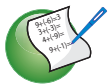
Month	June	July	Aug.	Sept.	Oct.	Nov.
Rainfall Compared to Monthly Mean	-2	-0.6	-3.8	-1.3	0.1	-1.3

- Which months had more rainfall than the monthly mean?
- Which month had rainfall closest to its monthly mean?
- Which month had rainfall farthest from its monthly mean?



Vocabulary and Concept Check

- NUMBER SENSE** Is a negative decimal *always*, *sometimes*, or *never* equal to a positive decimal? Explain.
- NUMBER SENSE** On a number line, is -2.06 or -2.6 farther to the left?



Practice and Problem Solving

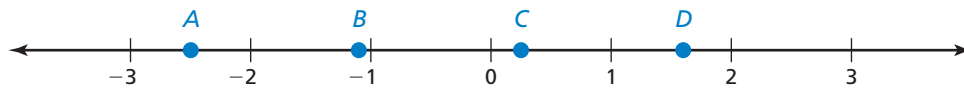
Estimate the location of the point on the number line.

3. A

4. B

5. C

6. D



Which number is greater? Explain.

7. $3.7, -3.2$ 8. $-1.6, 0.3$ 9. $-0.9, -1.1$ 10. $-10.4, -10.04$
11. $4.9, -4.5$ 12. $-5.2, 6.3$ 13. $-0.05, -0.12$ 14. $-2.64, -2.87$

Use a number line to determine whether the number is between -4.7 and -5.7 .

15. -4.24 16. -5.3 17. -5.75 18. -4.98

Use a number line to determine whether the number is between -8.4 and -9.6 .

19. -10.2 20. -8.36 21. -9.77 22. -8.45

- ERROR ANALYSIS** Describe and correct the error in determining which number is greater.



-2.4 is greater than -2.14 because 2.4 is greater than 2.14 .

- POPULATION** The table shows the percent change in population for each of six U.S. cities in a recent 5-year period.

- Use a number line to determine which city had the least percent change in population.
- Did the population of the city that had the least percent change necessarily decrease by the least number of people? Explain your reasoning.

City	Percent Change
Baltimore, MD	-3.13
Buffalo, NY	-5.70
Chicago, IL	-2.21
Detroit, MI	-8.40
Minneapolis, MN	-2.66
Philadelphia, PA	-4.77

Which number is greater? Explain.

25. -2.64 , $2\frac{3}{10}$

26. -4.06 , $-4\frac{1}{10}$

27. $-\frac{5}{8}$, -0.52

28. $-7\frac{3}{4}$, -7.8

29. **STARS** The *apparent magnitude* of a star measures how bright the star appears as seen from Earth. The brighter the star, the lower the number. Which star is the brightest?

Star	Alpha Centauri	Antares	Canopus	Deneb	Sirius
Apparent Magnitude	-0.27	0.96	-0.72	1.25	-1.46

30. **OPEN-ENDED** Find four numbers, ordered from least to greatest, that are between -5.8 and -4.8 .



31. **GUITAR STRINGS** A guitar tuner allows you to tune a guitar string to its correct pitch. The units on a tuner are measured in *cents*. The units tell you how far above or below the string tone is from the correct pitch.

Guitar String	6	5	4	3	2	1
Actual Pitch Compared to Correct Pitch (cents)	-0.7	1.6	-2.3	2.8	2.4	-3.6

- a. Which number represents the correct pitch of a guitar string?
 b. Which strings have a pitch below the correct pitches?
 c. Which string has a pitch closest to its correct pitch?
 d. Which string has a pitch farthest from its correct pitch?
32. **Number Sense** What positive integer(s) can you substitute for x so that the numbers are ordered from least to greatest?
- a. $-\frac{3}{x}$, -40% , $-\frac{x}{12}$ b. -74% , $-\frac{4}{x}$, $-\frac{x}{15}$



Fair Game Review what you learned in previous grades & lessons

Use a number line to find the sum or difference.

33. $-3 - 8$

34. $-5 + 7$

35. $7 - 12$

36. $-9 + 3$

37. **MULTIPLE CHOICE** Which function is shown in the table?

(A) $y = x + 2$

(B) $y = \frac{x}{3}$

(C) $y = 3x$

(D) $y = x + 3$

Input, x	Output, y
1	3
2	6
5	15
7	21